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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/375,309	08/16/1999	PIERRE ZAKARAUSKAS	11336/616 (P99084US)	4869

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EXAMINER

ARMSTRONG, ANGELA A

ART UNIT	PAPER NUMBER
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2654

DATE MAILED: 02/13/2004

26

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/375,309

Applicant(s)

ZAKARAUSKAS, PIERRE

Examiner

Angela A. Armstrong

Art Unit

2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_\_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3,5 and 7-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,5 and 7-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 3, 5, and 7-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quatieri et al, "Noise Reduction Using Soft-Decision Sine-Wave Vector Quantization" in view of Kenyon et al (US Patent No. 4,843,562) and further in view of Fink et al (US Patent No. 5,933,801).
2. Regarding claims 1, 3, 5, 10-11, 13, and 15, Quatieri teaches enhancing an acoustic signal buried in noise within a digitized acoustic input signal (page 821, Abstract and Introduction);  
Transforming the digitized acoustic input signal to a time-frequency representation (page 821, section 2.1; page 822, section III)  
Estimating background noise level in the time-frequency representation (pages 822-824, Section III, Template Based Approaches, "noise variance" and "noise standard deviation")  
For each interval of the time-frequency representation containing significant signal levels, performing a signal-to-noise ratio weighted comparison of the time-frequency representation of such interval against a plurality of time-frequency templates in a signal model and determining a matching template in the signal model that best matches the time-frequency representation of such interval (pages 822-824, Section III, Template Based Approaches)

Replacing the digitized acoustic input signal with a low-noise output signal comprising a signal-to-noise ratio weighted mix of the time-frequency representation and the matching template (pages 822-824, Section III, Template Based Approaches).

Quatieri does not specifically teach isolating transient sounds and including transients in the estimation of the background noise. However, refer to Fink et al. who teach a method of transforming a speech signal which separates a speech signal into two signal parts (which includes a transient portion) and suggest implementation of the method as being extremely expedient for synthesizing well-defined sounds (abstract).

Therefore, it would have been obvious to one of ordinary skill at the time of invention to modify the speech enhancement system of Liu to implement transient detection and estimation in conjunction with signal and background noise estimation, for the purpose of improving synthesis, as suggested by Fink et al.

Quatieri and Fink do not teach the templates used are spectrogram templates. Kenyon teaches a broadcast information classification system and method which uses spectrograms as the templates used for comparison and classification (col. 5, lines 3-26). Kenyon teaches the system provides for accurate recognition (col. 4, lines 34-35).

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to modify the system of Quatieri and Fink to implement spectrogram comparison and classification, as suggested by Kenyon, for the purpose of providing for accurate recognition/classification, as also suggested by Kenyon.

3. Regarding claims 7-9, 17-18, 20 and 22 Quatieri teaches enhancing an acoustic signal buried in noise within a digitized acoustic input signal (page 821, Abstract and Introduction);

Transforming the digitized acoustic input signal to a time-frequency representation (page 821, section 2.1; page 822, section III)

Estimating background noise level in the time-frequency representation (pages 822-824, Section III, Template Based Approaches, “noise variance” and “noise standard deviation”)

Determining signal strength in the time-frequency representation (pages 822-824, Section III, Template Based Approaches, “voicing probability”)

Performing a signal-to-noise ratio weighted comparison of the time-frequency representation of such interval against a plurality of time-frequency templates in a signal model and determining a matching template in the signal model that best matches the time-frequency representation of such interval (pages 822-824, Section III, Template Based Approaches)

Replacing the digitized acoustic input signal with a low-noise output signal comprising a signal-to-noise ratio weighted mix of the time-frequency representation and the matching template (pages 822-824, Section III, Template Based Approaches).

Quatieri does not specifically teach isolating transient sounds and including transients in the estimation of the background noise. However, refer to Fink et al. who teach a method of transforming a speech signal which separates a speech signal into two signal parts (which includes a transient portion) and suggest implementation of the method as being extremely expedient for synthesizing well-defined sounds (abstract).

Therefore, it would have been obvious to one of ordinary skill at the time of invention to modify the speech enhancement system of Liu to implement transient detection and estimation in conjunction with signal and background noise estimation, for the purpose of improving synthesis, as suggested by Fink et al.

Art Unit: 2654

Quatieri does not teach the templates used are spectrogram templates. Kenyon teaches a broadcast information classification system and method which uses spectrograms as the templates used for comparison and classification (col. 5, lines 3-26). Kenyon teaches the system provides for accurate recognition (col. 4, lines 34-35).

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to modify the system of Quatieri to implement spectrogram comparison and classification, as suggested by Kenyon, for the purpose of providing for accurate recognition/classification, as also suggested by Kenyon.

4. Regarding claims 12, 14, 16, 19, 21, and 23, Quatieri does not teach the specific signal-to-noise ratio weighted mix claimed therein. However, Quatieri teaches a signal-to-noise ratio weighted mix based on P templates, voicing probability, noise factors, template weights, and B(w) time frequency representation (pages 822-824, Section III, Template Based Approaches), and finding optimum relationships of the known variables of an equation requires routine skill in the art.

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to modify the signal-to-noise weighting of Quatieri to find an optimum relationship of the variables of the ratio, requiring routine skill in the art, so as to provide an enhanced noise reduction system.

#### ***Response to Arguments***

5. Applicant's arguments with respect to claims 1, 3, 5, and 7-23 have been considered but are moot in view of the new ground(s) of rejection.

*Conclusion*

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 2654

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angela A. Armstrong whose telephone number is 703-308-6258. The examiner can normally be reached on Monday-Thursday 7:30-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (703) 305-9645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Angela A. Armstrong  
Examiner  
Art Unit 2654

AAA  
February 8, 2004



**RICHEMOND DORVIL**  
**SUPERVISORY PATENT EXAMINER**